



**PRAVARA INSTITUTE OF MEDICAL SCIENCES
(DEEMED TO BE UNIVERSITY)**

**Loni, Tal. Rahata, Dist. Ahmednagar 413736
NAAC Re-accredited with 'A' Grade**

SYLLABUS

**Fellowship Programme in Surgical Pathology and Oncopathology
(Dept. of Pathology, Dr. Balasaheb Vikhe Patil Rural Medical College)
(Academic Council Meeting Dated 12th August 2024)**

**Fellowship in Surgical Pathology and Oncopathology
Curriculum**

GOAL:

The goal of Fellowship in Surgical Pathology and Oncopathology shall be to produce competent specialist.

- (i) Who shall recognize the health needs of the community and carry out professional obligation ethically and in keeping with the objectives of the national health policy;
- (ii) Who shall have mastered most of the competencies, pertaining to the specialty that is required to be practiced at the secondary and tertiary levels of the healthcare delivery system
- (iii) Who shall be aware of contemporary advances and developments in the discipline concerned
- (iv) Who shall be able to organize and establish Surgical Pathology laboratory.
- (v) Who shall have acquired a spirit of scientific inquiry and is oriented to the principles of research methodology.
- (vi) Who shall be able to teach and share his knowledge and competence with others.

SUBJECT SPECIFIC LEARNING OBJECTIVES

The learning objectives in the cognitive, psychomotor and affective domains are:

A. Cognitive Domain

1. Diagnose routine and complex clinical problems on the basis of histopathology including Frozen section (surgical pathology) and cytopathology specimens,
2. Interpret clinical and laboratory data with reasonable accuracy and prepare a succinct and lucid report. Compose reports following standard protocols including synoptic reporting.

3. Interpret and correlate clinical and laboratory data so that clinical manifestations of diseases can be explained.
4. Advise on the appropriate specimens and tests necessary to arrive at a diagnosis in a problematic case.
5. Maintain quality control of all tests by being part of Internal Quality Control Monitoring program. Make and record observations systematically and maintain accurate records of tests and their results for reasonable periods of time. Identify problems in the laboratory, offer solutions thereof and maintain a high order of quality control.
6. Capable of safe and effective disposal of laboratory waste.
7. Plan, execute, analyse and present research work independently or as part of a team. The postgraduate student in Pathology should acquire knowledge and skills to be able to conduct a research project from the planning to the publication stage and become a life-long learner.
8. Able to supervise and work with subordinates and colleagues in a laboratory.

B. Affective Domain

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. Psychomotor Domain

1. Able to perform routine tests in a Pathology Laboratory including grossing of specimens, processing, cutting of paraffin and frozen sections, making smears, and staining.
 2. Provide appropriate help to colleagues performing an invasive procedure such as a biopsy or an imaging guided biopsy.
 3. Should be familiar with the function, handling and routine care of equipments in the laboratory.
- ❖ At the end of the course, **the student should have acquired the following competencies as a diagnostician:**

A. Surgical Pathology

Knowledge

1. The student should be able to demonstrate an understanding of the histogenetic and patho-physiologic processes associated with various lesions.
2. Should be able to identify problems in the laboratory and offer viable solutions.

3. Possess the background knowledge necessary for the evaluation and reporting of Surgical Pathology.
4. Should be conversant with the various equipments used in the histopathology laboratory. Should have knowledge of automation and quality assurance in histopathology.

Skills

1. Given the clinical and operative data, the student should be able to identify, and systematically and accurately describe the chief gross anatomic alterations in the surgically removed specimens and be able to correctly diagnose at least 80% of the lesions received on an average day from the surgical service of an average teaching hospital.
2. A student should be able to demonstrate ability to perform a systematic gross examination of the tissues including the taking of appropriate tissue sections and in special cases as in intestinal mucosal biopsies, muscle biopsies and nerve biopsies, demonstrate the orientation of tissues in paraffin blocks.
3. The student should be able to identify and systematically and accurately describe the chief histo-morphological alterations in the tissue received in the surgical pathology service. He/she should also correctly interpret and correlate with the clinical data to diagnose at least 90% of the routine surgical material received on an average day.
4. Be conversant with automatic tissue processing machine and the principles of its running.
5. Process a tissue, make a paraffin block and cut sections of good quality on a rotary microtome.
6. Stain paraffin sections with at least the following:
 - a. Haematoxylin and eosin
 - b. Stains for collagen, elastic fibers and reticulin
 - c. Iron stain
 - d. PAS stain
 - e. Acid fast stains
 - f. Any other stains needed for diagnosis.
7. Demonstrate understanding of the principles of:
 - a. Fixation of tissues
 - b. Processing of tissues for section cutting
 - c. Section cutting and maintenance of related equipment
 - d. Differential (special) stains and their utility
8. Cut a frozen section using cryostat, stain and interpret the slide in correlation with the clinical data provided.

9. Demonstrate the understanding of the utility of various immunohistochemical stains especially in the diagnosis of tumour subtypes.

B. Cytopathology

Knowledge

1. Should possess the background necessary for the evaluation and reporting of cytopathology specimens.
2. Demonstrate familiarity with the following, keeping in mind the indication for the test.
 - a) Choice of site from which smears may be taken
 - b) Demonstrate familiarity with, and guide clinical/radiology residents in keeping with the clinical information on the choice of site, collection, preservation, transport, type of preparation and method of obtaining various cytological specimens. (urine sample, gastricsmear, colonic lavage etc.)
 - c) Be conversant with the principles and preparation of solutions of stains.
3. Should be Conversant with the various equipment used in the cytopathology laboratory.
4. Should have knowledge of automation and quality assurance in cytopathology.

Skills

1. Independently prepare and stain good quality smears for cytopathologic examination.
2. Be conversant with the techniques for concentration of specimens: i.e. various filters, centrifuge and cytocentrifuge.
3. Independently be able to perform fine needle aspiration of all lumps in patients; make good quality smears, and be able to decide on the types of staining in a given case.
4. Given the relevant clinical data, he/she should be able to independently and correctly: Diagnose at least 75% of the cases received in a routine laboratory and categorize them into negative, inconclusive and positive.
5. Demonstrate ability in the technique of screening and dotting the slides for suspicious cells.
6. Indicate correctly the type of tumour, if present
7. Identify with reasonable accuracy the presence of organisms, fungi and parasites

C. Basic Sciences and Ancilliary study(in relation to Pathology)

a. Immunopathology

i. Knowledge

- ii. Demonstrate familiarity with the current concepts of structure and function of the immune system, its aberrations and mechanisms thereof.

- iii. Demonstrate familiarity with the scope, principles, limitations and interpretations of the results of the following procedures employed in clinical and experimental studies relating to immunology.
 - 1. ELISA techniques
 - 2. Radioimmunoassay
 - 3. HLA typing
- iv. Interpret simple immunological tests used in diagnosis of diseases and in research procedures.
 - 1. Immunoelectrophoresis
 - 2. Immunofluorescence techniques especially on kidney and skin biopsies
 - 3. Anti-nuclear antibody (ANA)
 - 4. Anti-neutrophil cytoplasmic antibody (ANCA)

b. Electron Microscopy

i. Knowledge

- ii. Demonstrate familiarity with the principles and techniques of electron microscopy and the working of an electron microscope (including Transmission and Scanning Electron microscope: TEM and SEM).
- iii. Recognise the appearance of the normal subcellular organelles and their common abnormalities (when provided with appropriate photographs).
- iv. Demonstrate familiarity with the tissue processing and staining methods for electron microscopy, including immune-labelling techniques and use of semi-thin sections.

c. Enzyme Histochemistry

i. Knowledge

- ii. Should be familiar with the principles, use and interpretation of common enzyme histochemical procedures (Alkaline Phosphatase, Acid Phosphatase, Glucose-6-Phosphate Dehydrogenase, Chloroacetate Esterase).

d. Immunohistochemistry and flow cytometry

i. Knowledge

- ii. Demonstrate familiarity with the principles and exact procedures of various immunohistochemical stains using both PAP (Peroxidase-antiperoxidase) and AP-AAP (Alk. Phosphatase-anti-Alk. Phosphatase) ABC (Avidin-Biotin Conjugate) systems; employing monoclonal and polyclonal antibodies including automation in procedure and interpretation..
- iii. Be aware of the limitations of immuno-histochemistry.

iv. Demonstrate familiarity with the principles and procedures of performing flowcytometry.

v. Skills (desirable)

1. Be able to perform immuno-histochemical staining using paraffin section with at least one of the commonly used antibodies (Cytokeratin or LCA) using PAP method.

e. Cytogenetics and Molecular biology

i. Knowledge

- ii. Demonstrate familiarity with the principles of molecular biology especially related to the understanding of disease processes and its use in various diagnostic tests at least including but not limited to in-situ hybridization, polymerase chain reaction,
- iii. Should understand the principles of molecular biology especially related to the understanding of disease processes and its use in various diagnostic tests.
- iv. Demonstrate familiarity with methods of Karyotyping and Fluorescent in-situ Hybridisation (FISH).
- v. Should be conversant with the principle and steps and interpretation of Polymerase Chain Reaction (PCR), Western Blot, Southern Blot, Northern Blot, Sanger Sequencing, Next generation sequencing and Hybridisation procedures.

f. Tissue Culture

i. Knowledge

- ii. Demonstrate familiarity with methods of tissue culture.

D. Quality Control

1. Demonstrate familiarity with various quality control programmes running in the department, both internal and external quality.
2. Demonstrate familiarity with inter and intra assay variations, batch variations, validation of chemicals and instruments.

E. Laboratory Safety and Good clinical lab practices

1. Demonstrate familiarity with good lab practices and safety, record maintenance of capital equipment and consumables, purchase specifications, approximate costs of reagents and equipment, maintenance of store logbooks, etc.

F. Biomedical Waste Management

1. Demonstrate familiarity with disposal methods for each specimen, reagents, instruments, autoclaving techniques, recycling of products and e-waste.

G. Conversant with the use of digital slide imaging, algorithms to evaluate findings in imaging, morphometry, and application of artificial intelligence.

Syllabus**Course contents:**

- ❖ It is difficult to give a precise outline of the Course Contents for Fellowship training. A Fellow is supposed to acquire not only the professional competence of a well trained specialist but also academic maturity, a capacity to reason and critically analyze scientific data as well as to keep himself abreast of the latest developments in the field of Pathology and related sciences. The study of Anatomic Pathology includes all aspects of Pathology as encompassed in the branches of General and Systemic Pathology.
- ❖ A brief outline of what is expected to be learnt during the Fellowship in Surgical Pathology and Oncopathology is under following head:
 - **General Pathology:**
 - Normal cell and tissue structure and function.
 - The changes in cellular structure and function in disease.
 - Causes of disease and its pathogenesis.
 - Reaction of cells, tissues, organ systems and the body as a whole to various sub lethal and lethal injuries.
 - **Systemic Pathology:**
 - The study of normal structure and function of various organ systems and the aetiopathogenesis, gross and microscopic alterations of structure of these organ systems in disease and functional correlation with clinical features.
 - **The student is expected to acquire a general acquaintance of techniques and principles and to interpret data in the following fields.**
 - Immunopathology
 - Electron microscopy
 - Histochemistry
 - Immunohistochemistry
 - Cytogenetics
 - Molecular Biology
 - Maintenance of records
 - Information retrieval, use of Computer and Internet in medicine.
 - Quality control, waste disposal
- ❖ **COGNITIVE DOMAIN:**
 - A. **General Pathology:**
 - a. **Normal cell and tissue structure and function:**
 - i. The changes in cellular structure and function in diseases.
 - ii. Causes of disease, its pathogenesis, reaction of cells, tissues, organ systems, and the body to various sub lethal and lethal injuries.
 - iii. Cellular adaptation, cell injury, and cell death.

- iv. Mechanism, morphology and examples of cell injury, necrosis, apoptosis, autophagy, and newer forms of cell death including necroptosis and pyroptosis.
 - v. Sub cellular and cellular responses and adaptation to injury.
 - vi. Intracellular and intercellular accumulations, pathological calcification, and cell aging.
- b. Acute and chronic inflammation:**
- i. Vascular and cellular events in acute inflammation, chemical mediators, outcome, and morphological patterns of acute inflammation.
 - ii. Chronic inflammation with special reference to granulomatous inflammation.
 - iii. Systemic effects and effects of deranged inflammation.
 - iv. Tissue renewal and repair: Regeneration healing and fibrosis.
 - v. Control of normal cell proliferation and tissue growth, mechanism of tissue regeneration, repair by healing and fibrosis.
 - vi. Extracellular matrix and cell matrix interactions.
- c. Hemodynamic disorders, thromboembolic disease, and shock:**
- i. Edema, hyperemia, congestion, and hemorrhage.
 - ii. Normal Hemostasis, thrombosis, DIC, embolism, infarction, and shock.
- d. Genetic Disorders**
- i. Principles of genetics, normal karyotyping.
 - ii. Mutations, Mendelian disorders, disorders with multifactorial inheritance cytogenetic disorders involving autosomes and sex chromosomes.
 - iii. Single gene disorders with nonclassic inheritance.
 - iv. Diagnosis of genetic disorders involving molecular and genetic techniques.
- e. Neoplasia**
- i. Definition, nomenclature, and biology of tumor growth
 - ii. Molecular basis of cancer with special reference to carcinogenic agents and molecular basis of multistep carcinogenesis.
 - iii. Epidemiology and clinical features of tumors.
 - iv. Grading, staging and laboratory diagnosis of cancer.
- f. Infectious Diseases**
- i. Pathology and general principles of microbial pathogenesis, special techniques for diagnosing bacterial, fungal, parasitic, and viral infections.
- g. Environmental and nutritional pathology**
- i. Common environmental and occupational exposures leading on to diseases.
 - ii. Nutritional deficiencies and obesity related disorders.

h. Disease of Infancy and Childhood

- i. Congenital anomalies, birth injuries, diseases of neonates, inborn errors of metabolism, tumor, and tumor like lesions of infancy and childhood.

i. Immunopathology

- i. Innate immunity- Role of phagocytic cells, complement, mast cells & humoral mechanisms.
- ii. Specific Acquired Immunity- Details about antibody production & action, Brief principles about memory, Ag specificity & vaccination.
- iii. Cell involved in Immune response- T- Lymphocytes, B-lymphocytes, macrophages, dendritic cells, and natural-killer cells.
- iv. Cytokines with details about their properties and functions.
- v. Structure and function of histocompatibility molecules and disease association.
- vi. Disorders of the immune system.
- vii. All hypersensitivity reactions.
- viii. Autoimmune disorders with special reference to SLE, Rheumatoid arthritis, Sjogren's syndrome, systemic sclerosis, polyarteritis nodosa and other vasculitides, Mixed connective tissue disorders and inflammatory disorders.
- ix. Immunodeficiency syndrome – Acquired with emphasis on AIDS.
- x. Amyloidosis including pathogenesis, special stains & clinical correlation.
- xi. Transplant rejection in detail.
- xii. Graft vs Host Disease.

B. Systemic Pathology:

The study of normal structure and function of various organ systems and the etiopathogenesis, gross and microscopic alterations of structure of these organ systems in disease and function and correlation with clinical features.

a. Blood vessels, lymphatic and veins

- i. Normal morphology, congenital anomalies, atherosclerosis, hypertensive vascular disease.
- ii. Inflammatory and neoplastic diseases of all the vessels.

b. Heart

- i. Normal morphology, its blood supply and effect of aging on heart.
- ii. Ischemic, Hypertensive, valvular, congenital heart diseases.
- iii. Cardiomyopathies
- iv. Myocardial disorders
- v. Pericardial diseases.
- vi. Tumors of the heart.

c. Lungs and Mediastinum

- i. Congenital anomalies
- ii. Obstructive and restrictive pulmonary diseases
- iii. Diseases of vascular origin
- iv. Infections of Lung
- v. Infections of Mediastinum
- vi. Tumors of lung
- vii. Lung transplantation
- viii. Diseases of pleura
- ix. Thymus - Developmental, autoimmune, and inflammatory disorder and tumors.

d. Head and Neck

- i. Oral cavity: - inflammatory disease, Preneoplastic lesions and tumors.
- ii. Diseases of teeth and supporting structures.
- iii. Upper airways and ear - congenital anomalies, infections, and tumors.
- iv. Salivary glands - Infections autoimmune disorders and tumors.

e. Gastrointestinal Tract

- i. Congenital anomalies, infections, inflammatory and vascular disorders and tumors of esophagus, stomach, small and large intestines, appendix, and anal canal.
- ii. Diseases of the peritoneum, Omentum and Mesentery Retroperitoneum.
- iii. Inflammatory and neoplastic lesions.

f. Liver

- i. Normal morphology with general features of hepatic disease including LFTs.
- ii. Infectious, autoimmune drug induced metabolic and circulatory disorders of liver.
- iii. Hepatic diseases associated with pregnancy, neonates, organ and bone marrowtransplantation.
- iv. Liver transplantation pathology.
- v. Cysts, Nodules, and tumors of liver.

g. Biliary tract

- i. Congenital anomalies, injuries, Infection, inflammation, of Gallstones and tumors of gallbladder and extra hepatic bile ducts. Pancreas.
- ii. Congenital anomalies, pancreatitis, and neoplasms of pancreas.

h. Kidney

- i. Clinical manifestations of renal diseases
- ii. Congenital anomalies
- iii. Diseases affecting glomeruli, tubules, interstitium and blood vessels.

- iv. Cystic diseases of kidney
- v. Nephrolithiasis
- vi. Tumors of kidney
- vii. Kidney Transplant pathology
- i. Lower urinary tract and male genital system**
 - i. Congenital anomalies, inflammation and tumors of bladder, ureter, urethra, penis, testis, epididymis, and Scrotum.
 - ii. Inflammation, enlargement, and tumors of prostate.
- j. Female genital tract**
 - i. Physiology, cytology and histology of female genital tract, menstrual disorders, and hormonal abnormalities.
 - ii. Congenital anomalies, inflammation, preneoplastic and neoplastic lesions of vulva, vagina, cervix, uterus, fallopian tubes, ovaries and mesonephron.
 - iii. Gestational and placental disorders.
- k. Breast**
 - i. Inflammations, benign epithelial lesions, and tumors of the breast.
 - ii. Diseases of male breast.
- l. Endocrine System**
 - i. Normal hormonal levels and functions of all the endocrine glands.
 - ii. Hypo and hyperactivity of glands of endocrine system i.e., pituitary, thyroid, parathyroid, pancreas, adrenals, and pineal gland.
 - iii. Autoimmune diseases, inflammations and tumors affecting these glands,
 - iv. Neuroendocrine tumors,
- m. Skin and Subcutaneous tissue**
 - i. Disorders of pigmentation and melanocytes,
 - ii. Inflammatory, vesiculobullous, and infectious disease,
 - iii. Proliferative lesions and Tumors of the epidermis, dermis, and skin appendage.
- n. Musculoskeletal system**
 - i. Bone Modelling, growth, and development, genetic and acquired abnormalities in bone cells, matrix and structure, fractures, necrosis and infections of bones, tumors and tumor-like lesions,
 - ii. Joints: Arthritis, tumor, and tumor-like lesions.
 - iii. Soft tissue: Tumors and tumor-like lesions.
- o. Peripheral nerves and skeletal muscles**
 - i. General reactions of motor units.
 - ii. Inflammatory, infectious, hereditary, metabolic, and traumatic neuropathies.

- iii. Atrophy, dystrophy, myopathies of the skeletal muscles.
- iv. Diseases of neuromuscular junction.
- v. Tumors of peripheral nerves and skeletal muscles.

p. Skull and Central Nervous System

- i. Degenerative, metabolic, toxic, demyelinating, infectious, cerebrovascular malformations, and traumatic injuries.
- ii. Tumors.

q. Eye and Orbit

- i. Infections, inflammatory, congenital diseases and neoplasms of orbit, eyelid, conjunctiva, sclera, uvea, cornea, retina, and optic nerves.

C. Hematology

a. Hematological manifestations of systemic diseases

- i. Liver disorders, renal disorders, infections, cancers, parasitic diseases, AIDS, pregnancy, and surgical patients.
- ii. Spleen and its disorders
- iii. Bone marrow biopsy interpretation

D. Special techniques

- a. The student is expected to acquire a general acquaintance of techniques and principles and to interpret data in the following fields:
 - i. Immunopathology,
 - ii. Electron microscopy,
 - iii. Histochemistry,
 - iv. Immunohistochemistry,
 - v. Cytogenetics and in-situ hybridization,
 - vi. Molecular Biology,
 - vii. Digital Pathology and image analysis,
- b. Maintenance of records,
- c. Information retrieval, use of Computer and Internet in medicine.

E. Instrumentation and automation

- a. Principles, indications, working, maintenance, and troubleshooting of equipment used in various laboratories:
- b. Histopathology laboratory – Histopathology tissue processor, microtome, water bath, embedding station, Stainer, IHC Stainer, ultramicrotome, etc.
- c. Microscopes – Immunofluorescence, FISH, Confocal, Electron, etc.
- d. Cytopathology Laboratory – Centrifuge, Cytocentrifuge, Cytospin apparatus, liquid-based cytology, etc.
- e. Digital pathology – Whole slide scanners
- f. Molecular pathology – PCR, Sanger sequencer, NGS sequencers, etc.
- g. Automation in Pathology.

- h. Good lab practices and safety, record maintenance of capital equipment and consumables, purchase specifications, approximate costs of reagents and equipment, maintenance of storelogbooks, etc.
- F. Quality assurance program**
- Internal and external quality assurance methods.
 - Intra assay variations, batch variations, validation of chemicals and instruments.
- G. Biomedical Waste management**
- Disposal methods for each specimen, reagents, instruments, autoclaving techniques, recycling of products and e-waste.
- H. Ethics and Medico legal aspects relevant to Pathology**
- I. Current topics and recent advances in pathology**

❖ **PSYCHOMOTOR DOMAIN:**

Demonstrate following predominant Psychomotor domain competencies

Sr. No.	Competency	Perform under supervision/ perform independently/ Observation only
I.	HISTOPATHOLOGY (SURGICAL PATHOLOGY)	
1.	Given the clinical and operative data, identify and systematically and accurately describe the chief gross anatomic alterations in the surgically removed specimens and be able to correctly diagnose common lesions received on an average day from the surgical service of an average teaching hospital	Independently
2.	Perform a systematic gross examination of the tissues including the taking of appropriate tissue sections and in special cases as in intestinal mucosal biopsies, muscle biopsies and nerve biopsies, demonstrate the orientation of tissues in paraffin blocks.	Independently
3.	Identify and systematically and accurately describe the chief histomorphological alterations in the tissue received in the surgical pathology service. He/she should also correctly interpret and correlate with the clinical data to diagnose routine surgical material received on an average day.	Independently
4.	Identify common problems in histopathology processing techniques (poor fixation, delayed fixation, poor staining, etc.) including automated tissue processing machine troubleshooting and rectify common problems	Independently
5.	Operate and maintain common equipment in the histopathology laboratory such as microtome, water bath, cryostat, tissue processor, auto Stainer, etc.	Perform under supervision
6.	Process a tissue, make a paraffin block and cut sections of good quality on a rotary microtome	Perform under supervision
7.	Stain paraffin sections with hematoxylin and eosin stain and common special stains needed for diagnosis	Independently

	8.	Cut a frozen section, stain and interpret the slide in correlation with the clinical data provided	Independently
	9.	Standardize and validate new antibodies for immunohistochemistry with understanding of controls, clones, and dilutions	Independently
	10.	Perform immunohistochemistry on paraffin sections using manual method	Independently
	11.	Identify common problems in immunohistochemistry procedure (artifacts, inadequate retrieval, section floating, IHC failure, etc.) and rectify such problems	Independently
	12.	Decide on the appropriate immunohistochemical panels for diagnosis, prognosis and predictive purposes in common disease conditions based on standard recommendations and interpret their results	Independently
	13.	Write histopathology reports, including synoptic reports, wherever needed, following protocols and international standards. The reports should be succinct and lucid, with clinical notes and advice, as necessary.	Independently
II	CYTOPATHOLOGY		
	1.	Perform fine needle aspiration of superficial lumps and make good quality smears including collection of material for cell block preparation and decide on the type of fixative and stain in a given case	Independently
	2.	Prepare and stain good quality smears for Cytopathological examination	Independently
	3.	Provide appropriate guidance to colleagues performing procedure such as a biopsy or an imaging guided biopsy including on-site microscopic assessment of specimen adequacy.	Independently
	4.	Decide on the technique of collection, preservation, transport and concentration of various exfoliative cytology specimens (such as filters, centrifuge, liquid-based cytology, cytospin, etc.)	Independently
	5.	Perform on-site adequacy assessment in image guided sampling procedures and decide on sample triage for routine diagnosis (type of preparation, stain, etc.) and ancillary tests including microbiological and molecular tests	Independently
	6.	Diagnose common cases received in a routine cytopathology laboratory and categorize them into negative, inconclusive and positive, using the correct technique of screening and dotting the slides for suspicious cells, correctly identify the type of tumor, if present, and the presence of organisms, fungi and parasites, if present	Independently
	7.	Perform preparations (cytospin smears, liquid-based cytology, cell blocks, etc.) of common cytological samples using equipment such as centrifuge, cytocentrifuge and liquid based cytology apparatus	Observation only

VII MOLECULAR BIOLOGY			
	1.	Interpret results of Polymerase Chain Reaction (PCR), real time PCR, Sanger Sequencing in a given clinical context.	Independently
	2.	Interpret results of in-situ hybridization (fluorescent and chromogenic) in a given clinical context	Independently
	3.	Prepare sample by appropriate methods and perform Polymerase Chain Reaction (PCR), real time PCR, Sanger Sequencing, and in-situ hybridization including troubleshooting	Observation only
VIII IMMUNOPATHOLOGY			
	1.	Interpret direct/ indirect immunofluorescence results in the context of common diseases of the skin, medical renal diseases and autoimmune diseases	Independently
	2.	Prepare sample by appropriate methods and perform indirect immunofluorescence on a frozen section from skin/ renal biopsy	Perform under supervision
IX ELECTRON MICROSCOPY			
	1.	Interpret transmission electron microscopy results in common non- neoplastic and neoplastic diseases	Independently
	2.	Prepare specimen by appropriate methods and process tissue for electron microscopy, interpret semi-thin sections and view ultra-thinsections under electron microscope	Observation only
X. DIGITAL PATHOLOGY			
	1.	Navigate and annotate whole slide scanned images	Independently
	2.	Select and scan slides for digitalization and perform basic image analysis functions such as length measurements, enumeration, etc.	Observation only

❖ TEACHING AND LEARNING METHODS

- Acquisition of competencies being the keystone of doctoral medical education, such training will be skills oriented. Learning in the program, essentially autonomous and self-directed, and emanating from academic and clinical work, shall also include assisted learning.
- **The formal sessions are meant to supplement this core effort.**
- All students joining the Fellowship in Surgical Pathology and Oncopathology shall work as full-time Senior residents/any other post during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process.
- They shall maintain a logbook for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time.
- **Rotation:(Postings to laboratories/assignments)**
 1. The One year training programme for the Fellowship in Surgical Pathology and Oncopathology will be arranged in the form of postings to different assignments/laboratories for specified periods as outlined below.

2. The period of such assignments/postings is for 12 months with breaks only for examinations and mandatory postings.
3. **Posting schedules may be modified depending on needs, feasibility and exigencies.**
4. For facilities not available in the parent institution as well as for additional knowledge and skill, extramural postings may be undertaken for one month.

Sr. No	Section/ Subject	Duration in months	Credits
1	Surgical Pathology	6	10
2	Immunohistochemistry	2	3
3	Cytopathology	3	5
4	Basic Sciences, Immunopathology, Cytogenetics, Electronmicroscopy, Molecular Biology etc.	1	2
	Total	12	20

➤ **Post Graduate Training-Teaching-Learning methods:**

- This will include a judicious mix of demonstrations, symposia, journal clubs, clinical meetings, seminars, small group discussion, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings, and any other collaborative activity with the allied departments.
- Methods with exposure to the applied aspects of the subject relevant to basic/clinical sciences will also be used.

A. **Lectures:**

B. **Journal club:**

C. **Student Seminar:**

D. **Student Symposium:**

E. **Laboratory work/ Interactive slide and gross sessions:**

F. **Interdepartmental colloquium**

G. 200 hours of Teaching and Learning 12 Credits

H. 100 hours of Assignment / Seminar / Group Discussion/ Tutorials 8 Credits

Sr. No	For Credit Points	Credits credited
1	600 hours of posting	20 Credits
2	200 hours of Teaching and Learning	12 Credits
3	100 hours of Assignment / Seminar / Group Discussion/ Tutorials	8 Credits
4	Total Credits	40 Credits

➤ **Logbook:**

- During the training period, the student should maintain a Logbook indicating the duration of the postings; /work done in areas of posting.
- The logbook entries must be done in real time.
- The purpose of the Logbook is to:
 - Help maintain a record of the work done during training,
 - Enable Faculty/Consultants to have direct information about the work done and intervene, if necessary,
 - Provide feedback and assess the progress of learning with experience gained periodically.

ASSESSMENT

FORMATIVE ASSESSMENT, i.e., during the training:

1. Formative assessment will be continual and will assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.
2. General Principles
 - a. Informal assessment during Posting in daily case discussion.
 - b. Informal assessment during seminars, journal presentations, case discussions, slide seminars & other teaching activities.
 - c. Internal Assessment will be frequent, cover all domains of learning and will be used to provide feedback to improve learning;
 - d. It will also cover professionalism and communication skills.

SUMMATIVE ASSESSMENT:

- ❖ **Essential pre-requisites for appearing for examination include:**
 1. **Attendance: Atleast 80%.**
 2. **Log Book**
- ❖ **Fellowship in Surgical Pathology and Oncopathology examination shall be in Two parts:-**

Exam	Maximum Marks	Minimum Marks
Theory:	200 marks.	100 marks.
Practicals and viva voce Examination:	200 marks	100 marks.

A. EXAMINATION PATTERN:**THEORY:****TOTAL: 200 marks.****Four Papers 100 marks each:**

Paper I	General Pathology, Pathophysiology, Immunopathology and , and molecular biology
Paper II	Systemic Pathology – Surgical and Cytopathology

Each Paper will be:**Full Questions: 3X20 Marks each – 60****Short Notes : 4X10 Marks Each – 40Dg****B. Practicals and viva voce Examination:****TOTAL: 200 marks.**

Sr No	Practical	Marks
1	Histopathology 15 cases	60
2	Cytopathology - 5 cases	20
3	Gross Pathology (Grossing) – 10 cases	40
4	Histotechniques	10
5	Ancilliary techniques Spots on Immuno-histochemistry / immuno-fluorescence/ FISH/ PCR/ Electronmicrophotograph etc.	20
6	Grand Viva	50
	TOTAL	200

3. RECOMMENDED TEXT BOOKS; REFERENCE BOOK AND JOURNALS:**a. Books (latest edition)**

1. Cotran, Kumar, Collins. Robin's Pathologic Basis of Disease
2. Ivan Damjanov, James Linder. Anderson's Pathology,
3. Juan Rosai, Ackerman's Surgical Pathology
4. Christopher D.M.Fletcher. Diagnostic Histopathology of tumours
5. Jurgen Ludwig, Hand book of Autopsy Practice;
6. Theory & practice of Histological Techniques edited by John. D.Bancroft
7. Histology for Pathologists. Stephen S. Sternberg (Ed), Raven Press, New York.
8. Diagnostic Surgical Pathology. Stephen S Sternberg. Lippincott, William Wilkins. Philadelphia.

9. Bone Marrow Pathology, Bain BJ, Clark DM, Lampert IA, Blackwell Science, Oxford.
10. Gradwohl's Clinical laboratory methods and diagnosis
11. Henry J.B Clinical Diagnostics and Management by Laboratory Methods, 22nd edition, 2012 published by W.B. Saunders & Company.
12. Lewis S.M, Bain D.J, Bates I, Dacie & Lewis Practical Haematology
13. Atlas and Text of Haematology by Tejinder Singh
14. Hoffbrand A.V, Catovsky D, Tuddenham G.D, Postgraduate Haematology .
15. Firkin F , Chesterman C, Penington D, de Gruchy's Clinical Haematology in Medical Practice
16. Greer J.P, Foerster J, Jukens J et. Al, Wintrobe's Clinical Haematology,
17. Mollison P.L, Blood transfusion in clinical medicine
18. Orell, Sterrett- Walters and Whittaker, Fine Needle Aspiration Cytology (Manual & Atlas)
19. Leopold G Koss, Diagnostic cytology and its histopathologic basis
20. Marluce Bibbo, Comprehensive cytopathology
21. Winnifred Grey, Grace T Mckee, Diagnostic cytopathology
22. Sudha R.Kini , Colour Atlas of differential diagnosis in exfoliative and aspiration cytopathology
23. Praful B. Godkar ,Clinical Biochemistry – Principles & practice, published by Bhalani Publishing House, Bombay
24. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics Edited by Carl Burt Edward R. Ashwood David E. Bruns,
25. Varley's Practical Clinical Biochemistry edited by Alan H. Gowen lock with assistance of Janet R Mc Mullay and Donald M. Mclauchlan
26. Parasitology (Protozoology & Helminthology.) in relation to clinical medicine –K.D.Chatterje published by Chatterjee Medical Publication.
27. Bailey & Scott Diagnostic Microbiology
28. WHO Classifications of tumours & tumour like lesions, published by IARC Press
29. Recent advances in Histopathology, Haematology etc.
30. Lever's Dermatopathology
31. Novak's Gynecologic and Obstetric Pathology with Clinical and Endocrine
32. Relations by Edmund R. Novak
33. Bone Pathology by H. Jaffe
34. MacSween's Pathology of the liver
35. Iochim's Lymph Node Pathology
36. Text Book on Breast Pathology by Tavasoli
37. Text Book on Thyroid Pathology by Geetha Jayaram
38. Heptinstall's Pathology of the Kidney
39. Enzinger's Soft Tissue Tumours

JOURNALS:

1. Acta Cytologica
2. The American Journal of Pathology
3. American Journal of Surgical Pathology, published by Lippincott & Raven
4. The American Journal of Hematology
5. The American Journal of Clinical Pathology
6. Archives of Pathology and Laboratory Medicine
7. Blood
8. British Journal of Haematology, published by Blackwell Sciences.
9. CANCER, International journal of American Cancer Society, published by John Wile & sons Inc.
10. Diagnostic Cytopathology published by Wiley Liss, inc, publication
11. Histopathology
12. Human Pathology
13. Haematology/Oncology Clinics of North America, published by W.B. Saunders &Company.
14. Journal of Cytology, published by I.AC.
15. I.C.M.R. Bulletin, published by ICMR
16. Indian Journal of Pathology & Microbiology, published by IAPM.
17. Indian Journal of Pathology and Microbiology
18. Indian Journal of Cancer, published by Indian Cancer Society.
19. Journal of Pathology
20. Journal of Clinical Pathology, published by B.M.J.
21. Laboratory Investigation
22. LANCET, published by Elsevier
23. Modern Pathology
24. Pathology
25. Seminars in Hematology
26. Seminars in Diagnostic Pathology
27. Virchows Archives
28. Year Book Series
29. Recent Advances Series




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